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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/576,231	04/14/2006	Atsushi Yabe	4700.P0327US	7188
23474 7590 10/20/2008 FLYNN THIEL BOUTELL & TANIS, P.C. 2026 RAMBLING ROAD KALAMAZOO, MI 49008-1631				
EXAMINER BAREFORD, KATHERINE A				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/576,231

Applicant(s)

YABE ET AL.

Examiner

Katherine A. Bareford

Art Unit

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 August 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 5 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 5 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/CDC)
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date: _____

DETAILED ACTION

1. The amendment of August 11, 2008 has been received and entered. With the entry of the amendment, claim 4 has been canceled, and claims 1-3 and 5 are pending for examination.

Specification

2. The substitute specification filed August 11, 2008 has been approved by the Examiner.

Claim Rejections - 35 USC § 112

3. The rejection of claim 5 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention is withdrawn due to the amendment to provide a positive recitation of actually performing the plating onto a substrate of August 11, 2008.

Claim Rejections - 35 USC § 102

4. The rejection of claims 1, 2 and 5 under 35 U.S.C. 102(b) as being anticipated by Amelio et al (US 4655833) is withdrawn due to the amendment of the claims to provide a specific reducing agent in the amendment of August 11, 2008.

5. The rejection of claims 1 and 2 under 35 U.S.C. 102(b) as being anticipated by Japan 03-287779 (hereinafter '779) is withdrawn due to the amendment of the claims to provide a specific reducing agent in the amendment of August 11, 2008.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 1-3 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amelio et al (US 4655833) in view of Verbunt (US 2004/0152303).

Amelio teaches an electroless copper plating solution. Column 2, lines 5-15. The plating solution contains a water-soluble nitrogen containing polymer. Column 2, lines 5-15 and 40-45. Amelio further teaches that electroless copper solutions will contain a reducing agent, giving examples of common reducing agents, but the solution is not limited to these. Column 3, lines 15-40 and claim 1, column 4, lines 55-60.

Claim 2: the water soluble nitrogen containing polymer can be a polyacrylamide. Column 2, lines 5-15 and 40-45.

Claim 5: a copper plating method to deposit copper on a substrate is provided using the electroless copper plating solution with the water soluble nitrogen containing polymer. Column 4, lines 35-50.

Amelio teaches all the features of these claims, except (1) the reducing agent made from glyoxylic acid and phosphinic acid (claim 1) and (2) the precise molecular weight, and Mw over Mn ratio (claim 3). However, Amelio does teach that the water soluble nitrogen containing polymer used can be, for example, Reten 210, Reten 220 or Reten 300 (column 2, lines 40-68) and that such polymers have a relatively high molecular weight of about 50,000-1,000,000 or more (column 3, lines 1-5).

Verbunt teaches that when providing electroless copper plating solutions, it is well known to provide that the reducing agent can be made up of a variety of reducing agents and their mixtures, including using the combination of glyoxylic acid and hypophosphite. Paragraph [0026]. Verbunt further teaches that the source of hypophosphite can be hypophosphorous acid (which the Examiner takes Official Notice

is another name for phosphinic acid). Paragraph [0026]. As a result, Verbunt would include combinations of glyoxylic acid and hypophosphorous acid as the reducing agent.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Amelio to provide that the reducing agent is made up of a combination of glyoxylic acid and hypophosphorous acid (phosphinic acid) as suggested by Verbunt with an expectation of desirable plating results, because Amelio teaches to use a copper electroless plating system with a reducing agent, and Verbunt teaches that a desirable reducing agent system for a copper electroless plating solution would be a combination of glyoxylic acid and hypophosphorous acid. It further would have been obvious to modify Amelio in view of Verbunt to use a water soluble nitrogen containing polymer with a molecular weight above 100,000, because Amelio teaches a range of 50,000 -1,000,000 or more and In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In *re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). As to the ratio of Mw over Mn, it is the Examiner's position that for the purposes of consistency and reproducibility it would have been obvious to use polymers of the same molecular weight, which would provide that the molecular weight and the number average molecular weight would be the same number, and therefore provide that Mw/Mn would be one, within the claimed range.

9. Claims 1-3 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japan 03-287779 (hereinafter '779).

'779 teaches an electroless copper plating solution. Abstract. The plating solution contains a water-soluble nitrogen containing polymer. Abstract (polyethyleneimine would be water soluble as indicated by claim 2). '779 further teaches the electroless copper solutions will contain a reducing agent, giving an example of hydrazine, but the solution is not limited to these. Abstract.

Claim 2: the water soluble nitrogen containing polymer can be a polyethyleneimine. Abstract.

'779 teaches all the features of these claims, except (1) the reducing agent made from glyoxylic acid and phosphinic acid (claim 1), (2) the precise molecular weight, and Mw over Mn ratio (claim 3) and (3) the actual plating (claim 5). However, '779 does teach that the water soluble nitrogen containing polymer (polyethyleneimine) used have a molecular weight of several hundred to several hundred thousand. Abstract.

Verbunt teaches that when providing electroless copper plating solutions, it is well known to provide that the reducing agent can be made up of a variety of reducing agents and their mixtures, including using the combination of glyoxylic acid and hypophosphite. Paragraph [0026]. Verbunt further teaches that the source of hypophosphite can be hypophosphorous acid (which the Examiner takes Official Notice is another name for phosphinic acid). Paragraph [0026]. As a result, Verbunt would

include combinations of glyoxylic acid and hypophosphorous acid as the reducing agent.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify '779 to provide that the reducing agent is made up of a combination of glyoxylic acid and hypophosphorous acid (phosphinic acid) as suggested by Verbunt with an expectation of desirable plating results, because '779 teaches to use a copper electroless plating system with a reducing agent, and Verbunt teaches that a desirable reducing agent system for a copper electroless plating solution would be a combination of glyoxylic acid and hypophosphorous acid. It would further have been obvious to modify '779 in view of Verbunt to use a water soluble nitrogen containing polymer with a molecular weight above 100,000, because '779 teaches a range of several hundred to several hundred thousand and In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). As to the ratio of Mw over Mn, it is the Examiner's position that for the purposes of consistency and reproducibility it would have been obvious to use polymers of the same molecular weight, which would provide that the molecular weight and the number average molecular weight would be the same number, and therefore provide that Mw/Mn would be one, within the claimed range. As to the plating with the provided copper plating bath, it is the Examiner's position that it would have been

obvious to use an electroless copper plating bath to actually plate copper, as that is the purpose that the bath is provided for.

Double Patenting

10. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

11. Claims 1-3 and 5 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 5 and 6 of copending Application No. 10/576,230 in view of Amelio et al (US 4655833). The claims of 10/576,230 teach an electroless plating method (and corresponding solution as used in the method) where an electroless copper plating solution is provided with glyoxylic acid and hypophosphorous acid (phosphinic acid) used as the reducing agents (claims 5

and 6). 10/576,230 does not teach to provide a water soluble nitrogen containing polymer in the solution or its features, however, Amelio provides a suggested teaching of using such a polymer in the copper plating solution as Amelio teaches an electroless copper plating solution. Column 2, lines 5-15. The plating solution contains a water-soluble nitrogen containing polymer, that can be a polyacrylamide. Column 2, lines 5-15 and 40-45. As to the precise molecular weight, and Mw over Mn ratio (claim 3), Amelio does teach that the water soluble nitrogen containing polymer used can be, for example, Reten 210, Reten 220 or Reten 300 (column 2, lines 40-68) and that such polymers have a relatively high molecular weight of about 50,000-1,000,000 or more (column 3, lines 1-5). It would have been obvious to modify 10/576,230 to provide the nitrogen containing polymer in the solution as described by Amelio to provide the beneficial increased plating rates described by Amelio (column 2, lines 15-25). It further would have been obvious to modify 10/576,230 in view of Amelio to use a water soluble nitrogen containing polymer with a molecular weight above 100,000, because Amelio teaches a range of 50,000 -1,000,000 or more and In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). As to the ratio of Mw over Mn, it is the Examiner's position that for the purposes of consistency and reproducibility it would have been obvious to use polymers of the same molecular weight, which would provide that the molecular weight and the number average molecular weight would be

the same number, and therefore provide that Mw/Mn would be one, within the claimed range.

This is a provisional obviousness-type double patenting rejection.

12. Claims 1-2 and 5 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-3 of copending Application No. 12/075,745. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of 12/075,745 teach an electroless plating method (and corresponding solution as used in the method) where an electroless copper plating solution is provided with glyoxylic acid and phosphinic acid used as the reducing agents (claims 1-2 of '745), and the solution also contains a water soluble nitrogen-containing polymer, that can be polyacrylamide or polyethyleneimine (claims 1, 3 or '745).

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

13. The PGPub for 10/576,230 is US 2007/0071904. The PGPub for 12/075,745 is US 2008/0224313.

Response to Arguments

14. Applicant's arguments with respect to claims 1-3 and 5 have been considered but are moot in view of the new ground(s) of rejection.

The Examiner has provided the new reference to Verbunt as to the suggestion to use the reducing agents of glyoxylic acid and phosphinic acid in combination. As to the argument that the Examples in the specification provide a showing of unexpected benefits associated with using both of these reducing agents in combination, the Examiner has reviewed these examples, however, the showing is not commensurate in scope with what is claimed (as discussed in MPEP 716.02(d)). In each of the examples, the same substrate is used (a silicon wafer with a film of tantalum nitride), and the substrate has a specific pretreatment method using a silane coupling agent. However, this substrate is not required by the present claims, nor is the pretreatment, and it has not been shown that the same effects would occur with other substrates or pretreatments. Furthermore, in each of the examples, ethylenediaminetetraacetate and 2, 2'-bipyridyl are used, as well as copper sulfate as the copper source, none of which is required by the claims, and it has not been shown that the same effects would occur with other bath containing materials. Furthermore, in each of the examples, the only water soluble nitrogen containing polymer is polyacrylamide or polyethyleimine, which is only provided in claim 2. As a result, a showing of unexpected benefits as to this specific combination of reducing agents has not been shown, and it would have been obvious to use the combination with an expectation of similar results to other reducing agents from the teaching of Verbunt.

The Examiner also notes the new obviousness-type double patenting rejections that are present due to the amendments to the claims.

Conclusion

15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katherine A. Bareford whose telephone number is (571) 272-1413. The examiner can normally be reached on M-F(6:00-3:30) First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy H. Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Katherine A. Bareford/
Primary Examiner, Art Unit 1792